

1

TOUCH DRIVEN METHOD AND APPARATUS TO INTEGRATE AND DISPLAY MULTIPLE IMAGE LAYERS FORMING ALTERNATE DEPICTIONS OF SAME SUBJECT MATTER

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of the following earlier filed, copending applications and claims the benefit thereof in accordance with 35 USC 120: U.S. patent application Ser. No. 10/913,105 entitled "Touch Detecting Interactive Display" filed on Aug. 6, 2004 in the names of W. Daniel Hillis and Bran Ferren; U.S. patent application Ser. No. 11/188,186 entitled "Method And Apparatus Continuing Action Of User Gestures Performed Upon A Touch Sensitive Interactive Display In Order To Simulate Inertia" filed on Jul. 22, 2005 in the names of W. Daniel Hillis and Bran Ferren. This application also claims the benefit under 35 USC 120 of the following application: U.S. Provisional Application No. 60/701,892 entitled "Interactive Display Technologies" filed on Jul. 22, 2005 in the names of W. Daniel Hillis et al. Each of the foregoing applications is fully incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to interactive display systems whose presentation is controlled through user performed touch. More particularly, the invention concerns various embodiments of method, apparatus, signal-bearing medium, and logic circuitry used in implementing an interactive display system that responds to user touch to selectively integrate different layers of imagery comprising alternate depictions of same subject matter.

2. Description of the Related Art

In many cases, a situation arises calling for user review of several alternate depictions of the same subject matter. For example, a city planner may seek to review a satellite photograph in conjunction with a graphical map depicting the same region. In another example, an architect may be interested in reviewing and correlating different floor plans of the same section of building. Similarly, a circuit designer may be motivated to gain understanding into the interrelationship between different layers of a multi-layer integrated circuit. Although the focus in each case is the same subject matter, there differing depictions that contrast by camera angle, time of view, level of a multi-layer structure, or other parameter.

Traditionally, people have reviewed such data in physical form, such as photographs, blueprints, diagrams, and the like. In this case, the reviewer must mentally assimilate alternate depictions of the common subject matter by aligning the depictions side-by-side, shuffling through them, etc. Another traditional vehicle for reviewing such data is the computer. With a computer, the reviewer can change from document to document (shuffling review), or view documents in separate windows (side-by-side review).

Although the foregoing approaches will always enjoy some popularity, the present inventors have sought ways to improve the interface between humans and computers.

SUMMARY OF THE INVENTION

An interactive display system, including a touch sensitive display, establishes a first image and at least one secondary images, each image representing various spatial coordinates,

2

the spatial coordinates overlapping at least in part such that each image comprises an alternate depiction of subject matter common to all of the images. The first image is presented upon the display. Responsive to user input including contact with the display, imagery presented by the display is updated to integrate a region of at least one of the secondary images into the display. Each integrated region has substantially identical represented coordinates as a counterpart region of the first image. Further, each integrated region is presented in same scale and display location as the counterpart region of the first image.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A is a block diagram of the hardware components and interconnections of an interactive multi-user touch sensitive interactive display system.

FIG. 1B is a plan view showing several users operating an interactive, touch detecting display.

FIG. 1C shows a side view of an interactive, touch detecting, tabletop projection display.

FIG. 1D is a block diagram of a digital data processing machine.

FIG. 1E shows an exemplary signal-bearing medium.

FIG. 1F shows exemplary logic circuitry.

FIG. 2A is a flowchart of a generalized sequence for operating a multi-user touch sensitive interactive display system.

FIG. 2B is a flowchart of a sequence for operating an interactive touch display system to integrate different layers of imagery comprising alternate depictions of same subject matter.

FIG. 3A shows a flowchart of exemplary operations to operate an interactive touch display system to effectuate a multi-layer fade mode.

FIG. 3B is a diagram showing an example of user participation in a fade mode.

FIG. 4A is a flowchart of exemplary operations to operate an interactive touch display system to effectuate a swipe mode.

FIG. 4B is a diagram showing an example of user participation in a swipe mode.

FIG. 5A is a flowchart of exemplary operations to operate an interactive touch display system to effectuate a slider mode.

FIG. 5B is a diagram showing an example of user participation in a slider mode.

DETAILED DESCRIPTION

The nature, objectives, and advantages of the invention will become more apparent to those skilled in the art after considering the following detailed description in connection with the accompanying drawings.

Hardware Components & Interconnections

Overall Structure

One aspect of the present disclosure concerns an interactive touch detecting display system, which may be embodied by various hardware components and interconnections, with one example being described in FIG. 1A. The system 120 includes a table 122 with a display surface 124, computer 126, and projector 128. The projector 128 projects imagery upon the display surface 124 under direction of the computer 126. As one example, the system 120 may be implemented by a